

Virginia Electric and Power Company  
Surry Power Station  
P. O. Box 315  
Surry, Virginia 23883

November 13, 1991

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, D. C. 20555

Serial No.: 91-525A  
Docket Nos.: 50-280  
50-281  
License Nos.: DPR-32  
DPR-37

Gentlemen:

Pursuant to Surry Power Station Technical Specifications, Virginia Electric and Power Company hereby submits the following Supplement to Licensee Event Report 91-017-00 for Units 1 and 2.

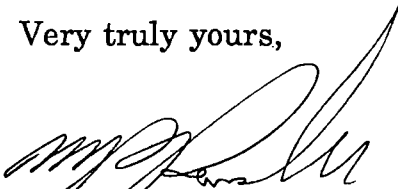
REPORT NUMBER

91-017-01

Changes or additions to the original report are indicated by side bars in the right hand margin of the report.

This report has been reviewed by the Station Nuclear Safety and Operating Committee and will be reviewed by the Corporate Management Safety Review Committee.

Very truly yours,



M. R. Kansler  
Station Manager

Enclosure

cc: Regional Administrator  
Suite 2900  
101 Marietta Street, NW  
Atlanta, Georgia 30323

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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Surry Power Station, Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 2 8 0	PAGE (3) 1 OF 5
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TITLE (4) Emergency Diesel Generator Rendered Inoperable Due to Personnel Error in That Specified in Testing Was Not Performed

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
05	09	91	91	017	01	11	13	91	Surry, Unit 2	0 5 0 0 0 2 8 1
										0 5 0 0 0

OPERATING MODE (9) N

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.38(c)(1)	50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(iii)	50.38(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
20.405(a)(1)(iv)	X 50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

POWER LEVEL (10) 100

LICENSEE CONTACT FOR THIS LER (12)

NAME M. R. Kansler, Station Manager	TELEPHONE NUMBER
	AREA CODE: 8 0 4      3 5 7 - 3 1 8 4

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)  NO

EXPECTED SUBMISSION DATE (15)

MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On August 9, 1991, with Unit 1 and Unit 2 at 100% power, it was determined that Emergency Diesel Generator (EDG) #3 had been inoperable since May 9, 1991. This determination was made while performing a root cause evaluation of the observed performance of EDG #3 during an August 2, 1991, Engineered Safeguards Feature (ESF) actuation on Unit 2. This safety injection/reactor trip, which occurred as a result of vital bus power oscillations on one channel and a failed steam generator pressure transmitter on another channel, is being reported separately by Licensee Event Report S2-91-007-00. A root cause investigation team appointed to determine the cause of the failure of EDG #3 to achieve rated speed found that inadequate Post Maintenance Testing (PMT) was performed following replacement of the governor on May 7, 1991. This was due to a cognitive error on the part of utility personnel in that an approved work order step which specified a fast start test of the EDG was not performed. During the period EDG #3 was inoperable, the Unit's other source of emergency power, EDG #2, was inoperable for approximately thirteen hours on July 15, 1991. This event is being reported pursuant to 10CFR50.73(a)(2)(i)(B) and (ii)(B).

**LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION**

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FACILITY NAME (1)  Surry Power Station, Unit 1	DOCKET NUMBER (2)  05100028091	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		91	017	01	02	OF 05

TEXT (If more space is required, use additional NRC Form 366A's) (17)

**1.0 DESCRIPTION OF THE EVENT**

On August 9, 1991, with Unit 1 and Unit 2 at 100% power, it was determined that Emergency Diesel Generator (EDG) #3 (EHS-EK-DG) had been inoperable since May 9, 1991. This determination was made while performing a root cause evaluation of the observed performance of EDG #3 during the August 2, 1991, Unit 2 Engineered Safeguards Feature (ESF) actuation. During this event EDG #3 failed to achieve rated speed of 900 rpm  $\pm$  2%. A speed of approximately 835 rpm was attained, which is equivalent to a frequency of 55.67 Hz. This speed is below the 870 rpm speed permissive needed to allow the EDG output breaker to close. Operator action would have been required to bring the EDG up to speed to allow the output breaker to close should it have been necessary for the EDG to supply electrical power to the emergency bus. Station procedures were in place to provide guidance to operating personnel to take appropriate action to adjust speed and energize the emergency bus if required. However, because manual operator action would have been required, EDG #3 was declared inoperable on August 2, 1991, since it could not automatically fulfill its design function.

Surry's EDGs utilize Woodward UG-8D governors for engine speed and load control. This governor is of a mechanical-hydraulic design and is driven by a spur gear on the accessory gear train of the EDGs. A new replacement governor was installed on EDG #3, adjusted, and tested satisfactorily for fast start operation on May 7, 1991 by a team consisting of a vendor representative and utility personnel. On May 8, 1991, full load post maintenance testing of EDG #3 was begun. During initial full load testing, EDG #3 would not achieve full load. The EDG was secured, a hot fuel rack adjustment was performed, and testing was resumed. During this subsequent full load testing, the engine exhibited slight load drift and additional adjustments were made to the governor. The cumulative affects of these adjustments was that EDG #3 would not achieve its rated speed when called upon to respond to a fast start. Because PMT was not performed to verify proper response of EDG #3 to a fast start following these adjustments, the root cause evaluation team determined that EDG #3 had been inoperable since May 9, 1991.

Since EDG #3 was previously believed to be operable from May 9, 1991 through August 2, 1991, the dedicated EDGs for Units 1 and 2 were not tested daily, nor were the units placed in cold shutdown within the required seven day period in accordance with Technical Specification 3.16.B.1. During the time period EDG #3 was inoperable, the redundant emergency power

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FACILITY NAME (1)  Surry Power Station, Unit 1	DOCKET NUMBER (2)  0 5   0 0   0 2   8   0 9   1	LER NUMBER (6)			PAGE (3)		
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

supply (EDG #2) had been inoperable for approximately thirteen hours on July 15, 1991. This event is being reported pursuant to 10CFR50.73(a)(2)(i)(B) and (ii)(B).

**2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS**

Surry's emergency electric power system is designed to provide reliable power to engineered safety functions and other essential loads in the event of loss of off-site power (LOOP). The system consists of three 100% capacity diesel generator sets for the two Units. One generator is used exclusively for Unit 1 (EDG #1), the second exclusively for Unit 2 (EDG #2), and the third (EDG #3) functions as a backup for either Unit. Each Unit has two emergency buses normally fed from an independent off-site power source, with the EDGs functioning as on-site backup power sources.

A safety injection signal, whether automatic or manually initiated, starts an EDG (EDG #1 or #2, depending upon the Unit affected) and the redundant EDG (EDG #3). By design, during a safety injection, the EDGs start and accelerate to 900 rpm, but their output breakers do not close unless there is an undervoltage condition sensed on the associated 4160 volt emergency bus.

During the event, EDGs #2 and #3 started as required and EDG #2 accelerated to 900 rpm. However, EDG #3 only accelerated to approximately 835 rpm which does not satisfy the 870 rpm speed permissive requirement for closure of the output breaker. This speed is also below the GDC-17 and EDG load-sequencing scheme acceptable minimum of 882 rpm. The EDGs by design are required to automatically supply electrical power to the 4160 volt emergency buses on a loss of power to those buses. Had it been required, existing procedures directed operations personnel to manually place EDG #3 on its respective emergency bus.

Although EDG #3 failed to achieve rated speed, during this event, EDG #2 functioned as designed and could have carried its emergency bus had the need arisen. Both during this event and on July 15, 1991 when EDG #2 was inoperable, no actual demands were made on the emergency power system. Therefore, the health and safety of the public were not affected.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

**3.0 CAUSE OF THE EVENT**

The reason for the EDG #3 not reaching its required speed and frequency range was attributed to a cognitive error on the part of utility personnel in that an approved work order step which specified a fast start test of EDG #3 was not performed. A contributing cause was that the post-maintenance testing follower associated with the work package did not specify an EDG fast start test be performed.

**4.0 IMMEDIATE CORRECTIVE ACTION(S)**

EDG #3 was declared inoperable August 2, 1991, and an investigation into its failure to achieve rated speed was initiated.

**5.0 ADDITIONAL CORRECTIVE ACTION(S)**

The governor for EDG #3 was readjusted and two consecutive fast start tests were performed satisfactorily. EDG #3 was declared operable at 1000 hours on August 3, 1991, approximately seventeen hours after it had failed to achieve rated speed.

EDG #1 and EDG #2 were also tested to verify operability. EDG #1 "as found" speed and frequency were within the allowable target band. EDG #2 "as found" speed and frequency were slightly above the target band, but the engine was determined to be operable. Both governors were adjusted and two more fast starts of each engine confirmed speed and frequency to be well within specification.

The governor gearing and speed knobs for the EDG #1 and EDG #2 governors were scribed at the 900 rpm setting. Because of previous testing activities for speed control of EDG #3, these scribe marks were already in place on that governor. Station operating procedures were changed to direct the speed knobs to be reset to the scribe marks as part of aligning the EDGs for automatic operation. The resetting of the speed knobs for the 900 rpm scribe marks eliminates the need for the servo motor to adjust the governor during the starting sequence. This resetting also makes up the high speed limit switch and prevents the servo motor from energizing.

"See through" cover plates plates have been installed on each engines governor limit switch enclosure so that the scribed match marks can be easily observed without disassembly. The match mark alignments are checked each shift to verify the governors are properly set.

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The procedures for EDG governor maintenance and fast start operation have been upgraded, and the PMT testing matrix for the EDGs has been revised to provide specific fast start testing requirements following governor maintenance.

This event was reviewed with station employees by corporate management at recent Employee Update Meetings, and the Station Manager issued a memorandum emphasizing procedural compliance and attention to detail.

**6.0 ACTIONS TO PREVENT RECURRENCE**

Training for station personnel involved in governor maintenance will be improved.

In order to ensure the effectiveness of the corrective actions taken to date, monthly EDG fast start testing will be conducted through December 1991. In addition, Event Review and Failure Analysis Evaluation Teams are reviewing testing data and overall EDG performance to ensure continued EDG reliability and availability.

**7.0 SIMILAR EVENTS**

None.

**8.0 ADDITIONAL INFORMATION**

None.